Attorney Docket No: 0553-0491

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)
Daisuke KUMAKI et al.	)
Serial No.: 10/573,929	)
Filed: March 30, 2006	)
For: Light-Emitting Element And Light-Emitting Device	)
Examiner: Phat X. Cao	)
Art Unit: 2814	)
Confirmation No.: 5395	)

Commissioner for Patents
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RESPONSE (E) AFTER FINAL

Applicants have the following response to the Final Rejection of November 18, 2009.

Interview

Applicants appreciate the Examiner agreeing to a personal interview during the week of March 15, 2010 to discuss the rejections in the Final Rejection. The undersigned will call the Examiner to set up the time and date.

Applicants will now address each of the Examiner's rejections in the order in which they appear in the Final Rejection.

Claim Rejections - 35 USC §103

Claims 1, 4-6, 7, 13-15, 19 and 20-23

In the Final Rejection, the Examiner continues to reject Claims 1, 4-6, 7, 13-15, 19 and 20-23 under 35 USC §103(a) as being unpatentable over Forrest et al. (US 5,703,436) in view of Liao et al. (US 6,717,358). This rejection is respectfully traversed.

In the rejection, the Examiner contends that Forrest teaches all of the features of the pending claims except for the materials in the electron-transporting material (ETL) and the hole-transporting material (HTL). Applicants respectfully disagree. Not only does Forrest fail to disclose the materials for the ETL and HTL, but Forrest also fails to disclose or suggest many of the claimed features in independent Claims 1 and 20-22.

Forrest does not disclose or suggest the claimed positional relationship of the anode and cathode recited in the pending claims

For example, independent Claim 1 recites the features of:

> "an anode;
> a first layer formed over the anode and containing a light-emitting material;
> a second layer formed over the first layer and containing an organic compound and an electron-supplying material;
> a third layer formed over and being in contact with the second layer, the third layer including a transparent conductive film;
> a fourth layer formed over and being in contact with the third layer and containing a hole-transporting medium; and
> a cathode formed over and being in contact with the fourth layer, the cathode containing a metal."

In contrast to the contention in the rejection, in Forrest, a cathode is not formed in contact with the fourth layer, as in Claim 1 and does not read on the positional relationship of the anode and cathode, as for example recited above for Claim 1.

More specifically, the Examiner contends that second electrode 26 is a cathode and is in contact with alleged fourth layer 20H. However, as Applicants previously explained in Amendment D, the "second electrode" 26 (i.e. top electrode 26) is an anode, not a cathode.

In response, in the "Response to Arguments" section in the Final Rejection, the Examiner cites Col. 5, lines 62-64 in Forrest to support of his position that item 26 ("second electrode") in Figure 2C in Forrest is a cathode. However, Col. 5, lines 62-64 are directed to the light-emitting device shown in Figures 2A and 2B (see the first line (line 57) in this paragraph in Forrest). The arrangement of batteries 30 to 32 in Figures 2A and 2B is opposite to that in Figure 2C. Hence, item 26 (see marked-up copy below) works as a cathode in the red emissive light-emitting element of Figure 2A.

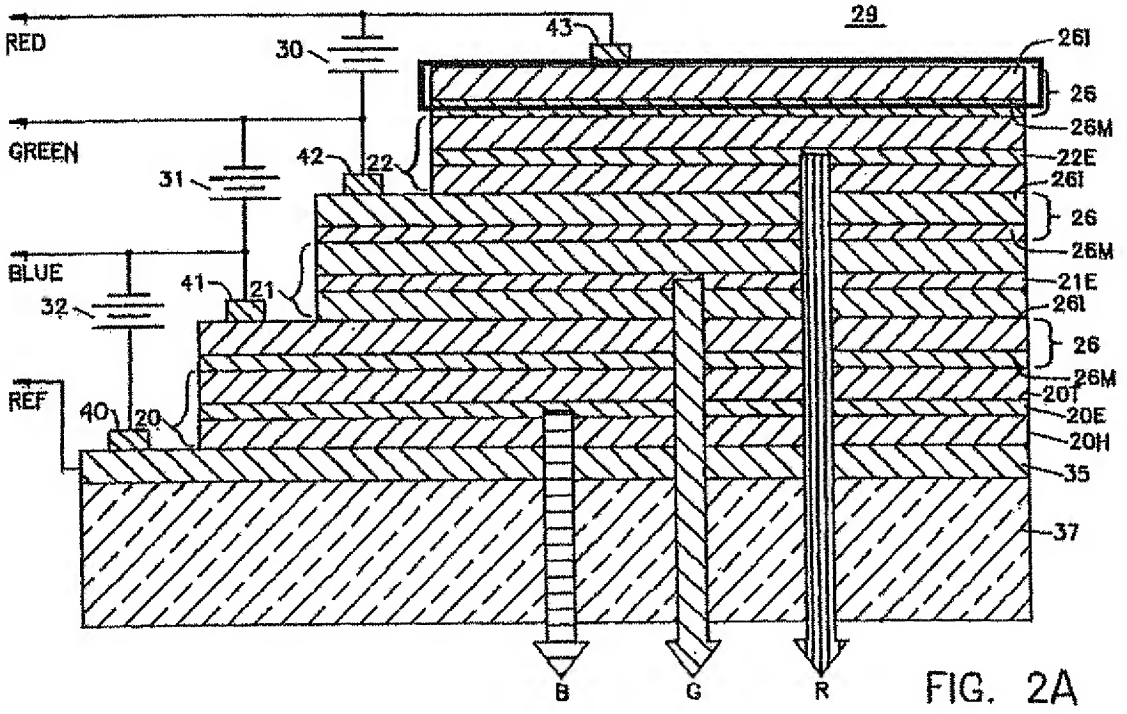

FIG. 2A

In contrast, in Figure 2C in Forrest, the arrangement (*i.e.*, direction) of the batteries is reversed. Therefore, an electron is supplied from battery 32 to an electrode of the blue emissive light-emitting element (*e.g.*, 1st item 26M in the marked-up copy of Figure 2C below), and the

electron is transported to the EL layer 20E through the electron transporting layer (ETL) 20T. Simultaneously, a hole is provided from battery 32 to item 26M (see 2nd item 26M in marked-up Figure 2C below), and the injected hole is transported to the EL layer 20E through the hole transporting layer (HTL 20H). Therefore, it is apparent that item 26M (1st one) functions as a cathode, and item 26M (2nd one) works as an anode. In a similar way, item 38 of Figure 2C, which was regarded by the Examiner as an anode, is a cathode (while item 35 in Figure 2A and 2B can be recognized as an anode). Hence, alleged forth layer 20H is in contact with an anode (2nd 26M - uppermost one) and not a cathode (1st 26M –lower one).

In addition, one skilled in the art would know that the organic light-emitting element has a rectification property. Therefore, a HTL is located closer to an anode than a cathode. Similarly, an ETL is located closer to a cathode than an anode. In the blue emissive light-emitting element in Forrest (the portion surrounded by the cross-hatched line in the marked-up copy of Figure 2C below), the HTL 20H is located in the anode side, and the ETL 20T is positioned in the cathode side. This is also evidence that item 2nd 26M is an anode, and the 1st 26M works as a cathode.

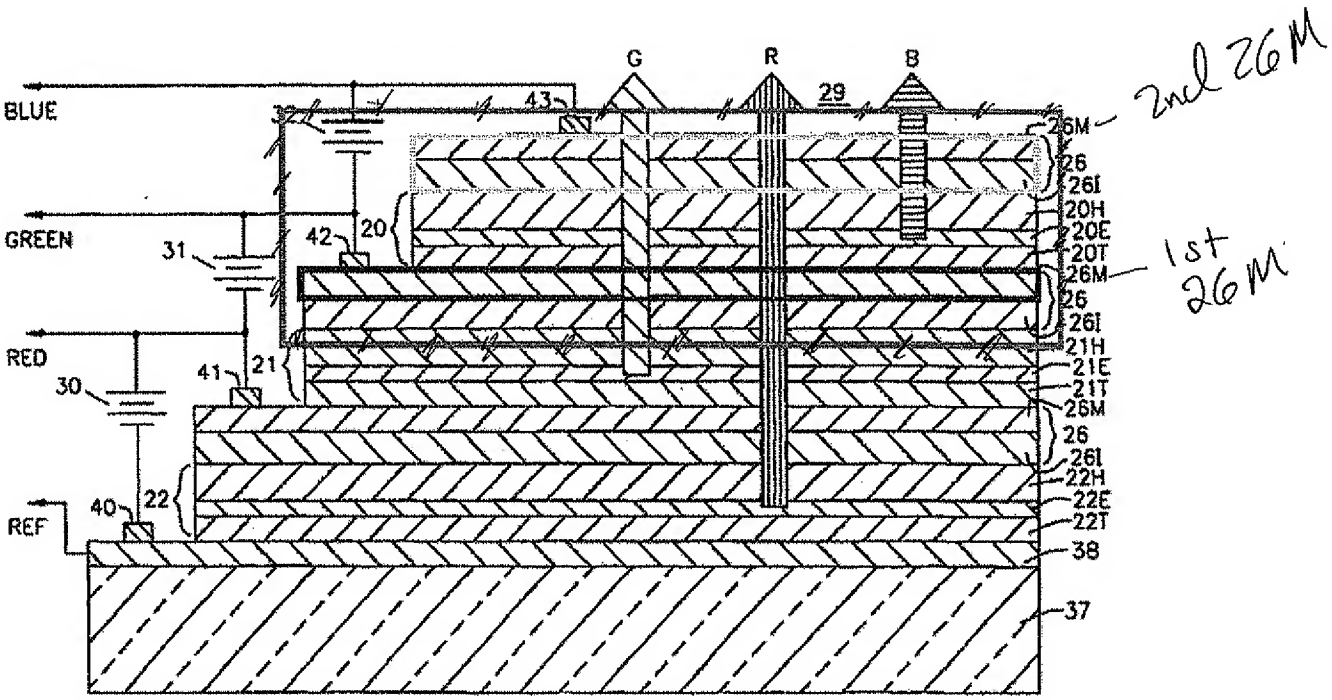

FIG. 2C

Therefore, Forrest does not disclose or suggest the positional relationship of the cathode and anode of the pending claims (such as Claim 1 reproduced above) and the claims are patentable over Forrest.

Forrest does not disclose or suggest the contacts in the claims

In addition, as Applicants explained in Amendment D, Claims 1, 20-22 recite the features of an anode and a cathode and that the third layer is "formed over and being in contact with the second layer," that the fourth layer is "formed over and being in contact with the third layer" and that the cathode is "formed over and being in contact with the fourth layer." These features are not disclosed or suggested by Forrest and/or Liao, as for example, alleged third layer 26 in Fig. 2C in Forrest (cited by the Examiner in the rejection) is not in contact with alleged second layer 21T, and alleged fourth layer 20H is not in contact with alleged third layer 26.

In the Final Rejection, the Examiner appears to be taking the position that "contact" includes

both "physical and direct contact" and "electrical contact." Even if this were true (which Applicants do not admit), in Forrest, such electrical contact is not provided between the first layer (22E) and the second layer (21T) and also between the third layer (26) and the fourth layer (20H).

In particular, as explained in the paragraph starting at line 56 in Column 5 in Forrest, each of the light-emitting elements (20, 21, and 22) of Figure 2B are driven by batteries 32, 31, 30 (this paragraph in Forrest is used to explain operation of the devices shown in Figures 2A and 2B; the device shown in Figure 2C in Forrest should operate in a similar manner). Additionally, each of the light-emitting elements (20, 21, and 22) are *made selectively energizable*, which means that they are operated independently (see col. 5, lines 65-67 in Forrest). As to the device 20 in Figure 2B, for example, current flows from the positive terminal of battery 32 to the ITO layer 35 (anode) and reaches ITO layer 26I through the EL layer 20E. However, the current goes back to the negative terminal of battery 32 through the cathode terminal 41 as described in Forrest. That is, current which passes the light-emitting element 20 is not further injected to the HTL (21H). If the current which passes the light-emitting element 20 is injected to the light-emitting element 21 including the HTL 21H, the light-emitting elements 20 and 21 cannot be energizable selectively (cannot be operated independently). The current which passes the light-emitting element 21 is supplied by battery 31 but is not supplied by battery 32. Hence, in Forrest, current which passes one of the light-emitting elements does not flow in the neighboring light-emitting element. Therefore, each of the light-emitting elements 20 to 22 appears to be electrically independent from each other and is not electrically connected with each other. Thus, the first layer (22E) in the light-emitting element 20 and the second layer (21T) in the light-emitting element 21, for example, are *not electrically* connected. As shown in Figure 2B, these layers are also not physically connected. The same is true for the lack of connection between the third layer (26) and the fourth layer (20H).

Therefore, the cited references do not disclose or suggest all of the claimed features of the pending claims of the present application.

There is no reason or motivation to combine references

In addition, *Forrest* teaches a device having the following structure:

cathode/emission layer/electron-transporting layer/transparent conductive film/hole transporting-layer/anode

It is apparent that such a device causes an increase in operation voltage since it is well known that the organic light-emitting element has a rectifying property. Specifically, in the above-mentioned device, a hole can be readily injected from the anode to the hole-transporting layer. However, it is quite difficult to transport the injected hole to the emission layer due to the presence of the electron-transporting layer between the emission layer and the hole-transporting layer. Therefore, one of ordinary skill in the art would not be motivated to incorporate the materials disclosed in Liao to such a *strange* device. The use Forrest as one of the references is a clear example of hindsight reconsideration and is improper.

The references teach away from each other

In addition, Liao clearly describes in column 5, lines 26-53 that the light-emitting element 100 is operated by applying a potential such that anode is at a more positive potential with respect to the cathode. By applying a potential in this way, electrons and holes can be generated in the connecting unit, and the generated electrons and holes are injected towards the anode and the cathode, respectively. Therefore, it is apparent that the application of the arrangement with respect to the anode and cathode of Forrest to Liao readily jeopardizes the device of Liao. Thus, the combination of these two references causes a teaching away. As explained in MPEP 2143.01, "[i]f

proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." Therefore, this combination of references is improper.

Therefore, independent Claims 1 and 20-22 are not disclosed or suggested by the cited references, the combination of references is improper, and Claims 1, 20-22 and those claims dependent thereon are patentable over the cited references. Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 16-18 and 24-26

The Examiner also rejects Claims 16-18 and 24-26 under 35 U.S.C. §103(a) as being unpatentable over Forrest and Liao in view of Kido et al. (US 2003/0189401). This rejection is also respectfully traversed.

These claims are dependent claims. Therefore, for at least the reasons discussed above for the independent claims, these claims are also patentable over the cited references. Accordingly, it is respectfully requested that this rejection be withdrawn.

Double Patenting

The Examiner also rejects Claims 1, 4-7, 13-17, 18-19 and 20-26 provisionally on the grounds of non statutory obviousness-type double patenting as being unpatentable over Claims 15-31 of copendng application no. 10/575,202 (or US 2007/0090376). This rejection is also respectfully traversed.

While Applicants traverse this rejection, it is respectfully requested that this rejection be held in abeyance until the prior art rejections are overcome and the claims are in their final form.

Conclusion

It is respectfully submitted that the present application is in a condition for allowance and should be allowed.

If any fee should be due for this response, please charge our deposit account 50/1039.

Favorable reconsideration is earnestly solicited.

Date: February 18, 2010

Respectfully submitted,

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